

REMARKS/ARGUMENTS

Claims 1-20 are pending. Claims 1, 4, 12 and 14 are currently amended for grammatical purposes. Claim 1 is also amended to include a particle size limitation which finds support in the specification: page 18, lines 21-24. Claims 16-20 are added. New claims 16 and 17 find support in the specification: page 18, lines 21-24. New claims 18-20 find support in the specification: page 3, lines 8-10. No new matter has been entered.

Claims 1-15 are rejected as obvious in view of *Martin* (US 4,771,086) and further in view of *Robinson* (US 5,279,664) or *McClain* (US 4,243,762). Applicants respectfully traverse this rejection.

Aqueous dispersions of composite particles are of general knowledge. They are fluid systems comprising an aqueous dispersion of particles comprising a polymer matrix and finely divided inorganic solid (specification: page 1, lines 5-10). Furthermore, the polymer matrix comprises polymer coils consisting of a plurality of intertwined polymer chains (specification: page 1, lines 17-19). A disadvantage of traditional aqueous composite-particle dispersions or of aqueous formulations comprising the dispersions is that upon prolonged storage, in particular at temperatures of 40°C or more, they may exhibit a viscosity increase which may even go as far as gelling (specification: page 1, lines 34-37). In extreme cases the aqueous composite-particle dispersions or aqueous formulations comprising the dispersions may even become unusable for processing (specification: page 1, lines 38-40). However, despite the foregoing problems, Applicants' process offers a solution by providing a process for improving the storage stability of aqueous composite-particle dispersions and of aqueous formulations comprising the dispersions by the addition of a hydroxyl-containing alkylamino compound to the aqueous dispersion medium (specification: page 2, lines 1-9).

As the Office has already noted, *Martin* does not disclose "the use of hydroxyl containing amino compounds as the dispersing aid" (Office Action, page 2, last paragraph).

Therefore, one must look to *McClain* and/or *Robinson* for fulfillment of said deficiency of *Martin*.

McClain discloses the addition of alkanolamines to aqueous dispersions of polymers to aid in the prevention of polymer agglomeration in the aqueous dispersion media (Abstract). More specifically, *McClain* discloses such a use of alkanolamines with respect to a dispersion of “finely divided ethylene-vinyl ester interpolymer particles containing at least about 25% by weight of vinyl ester” (col. 2, lines 53-55). Furthermore, *McClain* defines “finely divided” as meaning “an average particle size ranging from about 20 up to about 500 microns” (col. 3, lines 13-16). In addition, throughout the reference *McClain* discloses a benefit of such addition of alkanolamines is the ability to recover the interpolymer particles from the dispersion via filtration (see e.g., col. 2, lines 56-60; col. 3, lines 27-34).

In contrast to *McClain*, Applicants’ process of adding a hydroxyl-containing alkylamino compound to an aqueous dispersion of polymer improves the storage stability of a dispersion of nano-particles (see claim 1). *McClain*’s disclosure is with respect to dispersions of particles that are large enough to be filtered and no less than 20 μm in size (20 μm =20,000nm) (see above). However, Applicants’ process is capable of stabilizing, even after prolonged storage and temperatures of 40°C or more, composite particles of 10-1000 nm in size (see claim 1), preferably 10-500 nm (see claim 16), and most preferably 10-250 nm (see claim 17). Therefore, Applicants’ process stabilizes particles of 1 μm or less, whereas *McClain* discloses a lower limit of 20 times that size (i.e., 20 μm). Furthermore, *McClain*’s process is drawn toward improving filtration of micro-particles, whereas the nano-particles of Applicants’ process are too small for traditional filtration. Thus, given that one skilled in the art would recognize that micro- and nano- techniques are usually not compatible, one would not have been motivated to use the micro-technique of *McClain* to solve a nano-problem. Even if one were to look to the micro-technique as disclosed by *McClain* for guidance, one

would not have expected successful long-term, high-temperature stability of nano-particles as provided by Applicants' process. Accordingly, without motivation to use the alkanolamines of *McClain's* micro-dispersions and without an expectation of success of such a technique with the nano-suspensions of *Martin*, Applicants' claims are not obvious in view of the combination of *Martin* and *McClain*.

With respect to *Robinson*, said reference discloses adding a dispersant comprising an amine compound to disperse comminuted solids in an aqueous medium (Abstract). More specifically, *Robinson* discloses the use of a 3-part dispersant comprising (1) an alkanolamine, (2) a base and (3) a chelating agent (col. 1, lines 43-52). Furthermore, *Robinson* discloses that such a dispersant is "useful for dispersing a variety of comminuted solids including calcium carbonate, inorganic pigments such as iron oxides, talc (magnesium silicates), silica, mica, bentonite, carbon black, chrome pigments, and organic pigments" (col. 2, lines 34-39) as well as the fact that "[t]hese comminuted solids are typically present in pigment slurries" (col. 2, lines 39-40). It should be noted that there is no disclosure of particle size in the nanometer range as claimed.

In contrast to *Robinson*, Applicants' process requires the addition of a hydroxyl-containing alkylamino compound to an aqueous dispersion of polymer to improve the storage stability of a dispersion of nano-particles (see claim 1). Applicants' process uses a 1-part dispersant comprising alkanolamine (see claim 1 and 18), whereas *Robinson's* 3-part dispersant requires, in addition to 10-55 wt% of alkanolamine (col. 1, lines 46-48), 15-35 wt% of a base (col. 1, lines 48-51) as well as 0.1-15 wt% of a chelating agent (col. 1, lines 51-52) to produce the documented results. The 3-part dispersant of *Robinson* is prepared separately and then added to the paint formulation (col. 3, line 60, to col. 4, line 3). Thus, the alkanolamine, base and chelating agent have already reacted to form products other than alkanolamine before being added to the paint formulation for stability purposes. Clearly, the

use of such a 3-part dispersant as disclosed by *Robinson* does not disclose or suggest a process which includes adding non-reacted alkanolamine by itself to the dispersion as claimed by Applicants (see claim 1).

Furthermore, Applicants' process stabilizes, even after prolonged storage and temperatures of 40°C or more, polymer dispersions having particles of 1 μ m or less in size (see claim 1). Again, *Robinson* is silent with respect to the size of the pigments dispersed in the paint with the aid of the 3-part dispersant. Thus, given the silences of *Robinson* with respect to the use a 3-part dispersant comprising alkanolamine to stabilize nano-particles as claimed by Applicants, there would be no motivation to use such a dispersant in the nano-sized particle suspensions of *Martin*. Accordingly, without motivation to use the dispersant of *Robinson* in the suspensions of *Martin* and the silence of *Martin* with respect to alkanolamine dispersing aids (see above), Applicants' claims are not obvious in view of the combination of *Robinson* and *Martin*.

Applicants submit that all now-pending claims are in condition for allowance. Applicants respectfully request the withdrawal of the rejections and passage of this case to issue.

Respectfully submitted,

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